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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
WHITTINGTON, KENNETH	
ART UNIT	**PAPER NUMBER**
2862	

DATE MAILED: 06/06/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

H·A

Office Action Summary	Application No.	Applicant(s)	
	10/616,429	BITTAR, MICHAEL S.	
	Examiner	Art Unit	
	Kenneth J. Whittington	2862	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 April 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-62* is/are pending in the application.

4a) Of the above claim(s) *1-12,17-41 and 49-62* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *13-16 and 42-46* is/are rejected.

7)☒ Claim(s) *47 and 48* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Bot Ledynh
Primary Examiner

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

The Amendment filed April 13, 2005 has been entered and considered. In view thereof, the objections to the specification and abstract have been withdrawn.

Claim Rejections - 35 USC § 102

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 13-16 are rejected under 35 U.S.C. 102(e) as being anticipated by Minerbo et al. (U.S. 6,304,086), hereinafter Minerbo. It is noted that this application claims priority to U.S. Application Serial No. 09/238,832, filed on January 29, 1999, which predates Minerbo, which has an effective date of September 7, 1999. However, the material of the claims of the present application relates to new matter added into the Continuation-in-part Application Serial No. 09/615,501, filed on July 13, 2000. Thus, the disclosure of Minerbo qualifies as prior art with respect to this new matter, and accordingly the present claims.

Regarding claim 13, Minerbo discloses, with particular reference to FIGS. 7-9 and col. 17, line 41 to col. 18, line 36, an embodiment of an apparatus and method for evaluating resistivity of formations having a tool axis which can be used

to optimize performance during a drilling operation based on data collected during the drilling (See col. 1, lines 20-55). The embodiment shown in FIG. 9 comprises a pair of transmitters (FIG. 9, items T1 and T2), each disposed in a plane oriented at an angle with respect to the tool axis (See col. 18, lines 20-25). The transmitters each transmit an electromagnetic wave into the formation, the wave induces an electric current in the formation, and the current induces an induced magnetic wave in the formation (See col. 5, lines 2-35). The embodiment also comprises a pair of receivers (FIG. 9, items R1 and R2), each oriented at an angle with respect to the tool axis, this angle not being equal to either angle of the transmitters (col. 8, lines 28-30). The receivers each receive a pair of the induced magnetic waves, i.e., one from each receiver for a total of four signals between the two receivers, and convert them into an electric signal that is sent to a surface computer (See FIG. 16, item 310 and col. 20, lines 49-61). The four signals sent from the receivers to the surface computer are representative of the resistivity of the formation (See col. 16, lines 7-14). The data can then be processed, recorded or computed as desired to generate a formation conductivity profile indicating the relative position of the tool with respect to the formation, which necessarily includes the bed boundaries (See col. 20,

lines 62-65 and note FIGS. 23 and 24) and by collecting such data during a drilling process, the driller will be notified of bed boundaries and can modify or correct steps of the operation to optimize performance (See col. 1, lines 29-50).

Regarding claim 14, Minerbo discloses the transmitters oriented at substantially similar angles (See FIG. 9).

Regarding claim 15, while Minerbo does not explicitly show the transmitters oriented at substantially perpendicular angles to the tool axis (See FIG. 9), the discussion with regard to FIG. 9, however, does suggest that the transmitters and receivers may be oriented in a different plane (See col. 18, lines 28-30) and does not limit the angle of orientation of either the transmitter or receiver, as long as the angles are different. Thus, Minerbo discloses that the transmitters shown in FIG. 9 can be perpendicular to the tool axis. Note also that other embodiments of Minerbo disclose the transmitters perpendicular to the tool axis (for example, see FIG. 7).

Regarding claim 16, Minerbo discloses the receivers oriented at substantially similar angles (See FIG. 9).

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 42-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Minerbo in view of Luling (US Pat. 5,241,273). Regarding claim 48, Minerbo discloses an apparatus and method for controlling a drilling operation to optimize parameters of the operation based on information collected during the drilling operation (See col. 1, lines 20-55). The apparatus for carrying out the method comprises a first transmitter oriented at an angle to a tool axis (See FIG. 9, item T1), a second transmitter spaced from the first at a second angle to the tool axis (See FIG. 9, item T2), a first receiver between the transmitters oriented at an angle to the tool axis different from the angles of the transmitters (See FIG. 9, item R1), a second receiver between the transmitters oriented at another angle to the tool axis different from the angles of the transmitters (See FIG. 9, item R2) and a processor in communication with each of the transmitters and the receivers.

Each of the transmitters (T1 and T2) transmits an electromagnetic wave into the formation, the wave induces an electric current in the formation, and the current induces an induced magnetic wave in the formation (See col. 5, lines 2-35). These induced waves can be interpreted as first and second induced electro-magnetic waves.

Each of the receivers R1 and R2 receives a pair of the induced electro-magnetic waves, i.e., one from each receiver for a total of four signals between the two receivers, and convert each received signal into an electric signal (See FIG. 16 and col. 20, lines 49-61). The four electrical signals are representative of the resistivity of the formation (See col. 16, lines 7-14).

The four electrical signals are then sent to a processor which determines a differential signal D_G (See col. 15, lines 5-11) based upon the electrical signals (See FIG. 16, item 310 and col. 20, lines 49-61) and equation 67 (See col. 17, line 49). Although Minerbo only discloses a single differential signal and does not explicitly disclose determining a first and second differential signal, it is inherent in Minerbo that the single differential signal calculation using equation 67 can be split into two separate calculations since such an operation would be a matter of mathematical division of equation 67 into components. Note that:

$$D_G = \frac{1}{2d}(V_{21} - V_{11} + V_{12} - V_{22}) = \frac{1}{2d}(V_{21} - V_{11}) + \frac{1}{2d}(V_{12} - V_{22})$$

$$D_G = \frac{1}{2d}(V_{21} - V_{11}) + \frac{1}{2d}(V_{12} - V_{22}) = D_{G1} + D_{G2}$$

Each calculation D_{G1} or D_{G2} would then simply represent the differential signal determined on the basis of signals received by both receivers R1 and R2 as a result of the transmission of a wave by a single transmitter T1 or T2.

The processor then uses the differential signal D_G (or the pair of differential signals D_{G1} and D_{G2}) to develop an output signal which can be stored as a conductivity profile, which can be used in conjunction with other techniques to keep track of the tool depth within a borehole (See Minerbo col. 20, line 62 to col. 21, line 4). This information, which can be collected during a drilling operation, can also be used to modify or correct key steps in a drilling operation to optimize performance (See col. 1, lines 40-44).

However, while Minerbo does disclose optimizing performance of a drilling operation, it does not explicitly disclose controlling the drilling direction of the drilling apparatus in response to the output signal. Luling teaches that is well known in the art to employ directional drilling, which is a process of determining the location of a pay zone and changing the direction of the drilling operation so that the drilling is carried out substantially within the payzone (See Luling col. 1, lines 13-26). The process of determining the location of the pay zone can be completed by wireline or resistivity logging

(See col. 1, lines 26-66). It would have been obvious to employ the method and apparatus of resistivity logging as disclosed in Minerbo in the directional drilling method known in the art, as described in Luling. One having ordinary skill in the art would have been motivated to do so to provide accurate resistivity profiles (See Minerbo col. 2, lines 53-61) for implementation into a wireline or logging-while-drilling operation (See col. 20, lines 47-48).

Regarding claims 43 and 45, Minerbo teaches that the processing of the voltages measured by receivers R1 and R2 are based on the relative phase delay and attenuation decrement in the data received at the receivers (See Minerbo col. 5, lines 9-18). Furthermore, the resistivity values, either D_{G1} or D_{G2} as noted above, is based upon these values.

Regarding claims 44 and 46, Minerbo further teaches that the calculations for the formation resistivity according to the invention can be made using a ratio of the voltages received, namely $(V_2-V_1)/V_1$ (See col. 16, lines 52-54). Furthermore, the resistivity values, either D_{G1} or D_{G2} as noted above, are based upon these ratios.

Allowable Subject Matter

Claims 47 and 48 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding claim 47, the reason for the indication of allowable subject matter is that the combination of Minerbo and Luling teaches using the sum of the differential signals to determine the output signal, which has the effect of reducing the spikes of measurement at the bed boundaries. However, the prior art fails to teach the difference of the differential signals as recited in the claim, which has the effect of amplifying the spikes at the bed boundaries.

Regarding claim 48, the prior art fails to disclose using the ratio of the differential signals to determine the output signal.

Response to Arguments

Applicant's arguments filed April 13, 2005 have been fully considered but they are not persuasive. Applicant's primary argument for patentability is that the subject matter of the claims should be given the priority date of the Parent applicant, now US Pat. No. 6,163,155, hereinafter Parent.

However, the rejection is based on the position that the subject matter of the present claims pertains to the material added into the continuation-in-part of the Parent, App. Serial No. 09/615,501, hereinafter the CIP. The present application is a divisional of the CIP.

Initially, it is noted that the recited antenna arrangement of the subject claims were not introduced in the Parent, but in the CIP. If this subject matter was indeed explicitly or inherently disclose in the Parent, Applicant would have been required only to file a continuation or divisional application. The filing of the CIP implicitly admits that Applicant has added new material.

Applicant's asserts that the Parent contemplates the particular arrangement of the present claims by noting that the arrangement of the present claims are merely members of the set of arrangements set forth in the Parent, particularly FIG. 7 of the Parent and that the Parent claim language recites "at least one transmitter" and a first and second receiver antenna (See Amendment page 27, 3rd paragraph to top of page 29). While these facts are not disputed, it is noted that in each of the embodiments of the Parent as shown in FIG. 7, the one or more transmitters are located above or on one side of the pair of receivers. While the claims in the Parent do not recite a

particular location for the transmitters, the claims do require that the first and second receivers be spaced a first and second distance "away from said at least one transmitter." Such an arrangement necessarily requires the at least one transmitter to be located in a single position with the receivers being located on either side. This arrangement coincides with the embodiments disclosed in the specification in FIG. 7. Such an arrangement at most allows for a receiver on each side of the at least one transmitter, with the possibility of both receivers being on the same side of the transmitters (such as in FIG. 7). None of these arrangements, however, provides a basis for a first and second transmitter being on each side of a pair of receivers as recited in the present claims. Thus, the subject matter of the Parent relating to the positioning does not provide a basis for the subject matter of the present claims.

Applicant secondly asserts that the relative positioning of the transmitters and receivers is not a critical element of the arrangements in the Parent (See Amendment page 29, 1st full paragraph). This argument is directly contrary to the claim language which specifically requires a pair of transmitters having a pair of receivers located therebetween. Furthermore, if the relative locations are not critical and ignored as Applicant is suggesting, the present application would be

subjectable to a statutory double patent rejection under 35 USC 101 over claims 1-37 of the Parent, which discloses multiple transmitters and receives in "relative positioning" arrangements.

Applicant furthermore throughout its arguments states that the feature common to each of the Parent, CIP and present application is the variation in angle orientation between the transmitter and receiver antennas, and thus provides a basis for the subject matter of the claims. However, it is noted that it is well known in the art to vary the angular orientation between the transmitter antennas and the receiver antennas, as specifically shown in US 5,508,616 (Sato et al.) and US 3,539,911 (Youmans et al.). Thus, the arrangement and relative positioning of the transmitter and receivers is the material that defines the claims over the prior art. And since the arrangement in the present application and the CIP was not disclosed in the Parent, it is new matter.

Finally, Applicant has provided several instances to support the conclusion that the arrangement of transmitters and receivers as recited in the present claims is new matter. For example, in the arguments of the Amendment (Amendment page 30, 1st paragraph), Applicant notes that the subject matter of the present application is a functional combination of the

schematics of the Parent. Furthermore, the present application notes that the claimed arrangement, wherein the first and second receiver antennas are between the first and second transmitter antennas, provides an added feature of reciprocity (See present application on pages 28-29, carryover paragraph). Thus, Applicant has implicitly admitted that the features recited in the present claims are not supported by the Parent without some functional assumptions and further notes that the present claims provides a function or property not contemplated or shown by the devices disclosed in the Parent.

In view of the forgoing, the subject matter contained in the recited claims was not disclosed, discussed or contemplated by the Parent application to which the present application claims priority. The material was first submitted in the CIP, of which the present application is a divisional. Accordingly, the subject matter of the present claims is accorded the filing date of the CIP, or July 13, 2000. Minerbo, having a filing date of September 7, 1999 is therefore a proper reference under 35 USC 102(e).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kenneth J. Whittington whose telephone number is (571) 272-2264. The examiner can normally be reached on Monday-Friday, 7:30am-4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Lefkowitz can be reached on (571) 272-2180. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Kenneth J Whittington
Examiner
Art Unit 2862

kjw